

APPLICATION NO. 09/433705

January 14, 2005

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1.-12. (Canceled)

13. (Currently Amended) A semiconductor device having an active matrix display device, said display device comprising:

- a first thin film transistor formed over an insulating surface;

- a pixel electrode electrically connected to said first thin film transistor;

- a driver circuit including a second thin film transistor formed over said insulating surface for driving said first thin film transistor,

wherein said first thin film transistor comprises:

- a first semiconductor island over the insulating surface;

- source and drain regions formed in the semiconductor island;

- a first channel forming region in the first semiconductor island between the source and drain regions;

- a pair of lightly doped regions formed between the first channel forming region and the source and drain regions, wherein an impurity concentration in the lightly doped regions is smaller than that in the source and drain regions;

- a gate electrode formed over the semiconductor island with a gate insulating film interposed therebetween;

- an interlayer insulating film formed over the gate electrode and the gate insulating film;

wherein said gate electrode comprises at least a first conductive layer and a second conductive layer formed on the first conductive layer, said first conductive layer

having a pair of tapered portions which extend beyond side edges of the second conductive layer,

wherein the pair of lightly doped regions has a pair of first portions which are overlapped by the pair of tapered portions of the first conductive layer, and a pair of second portions which extend beyond side edges of the first conductive layer, and

wherein said interlayer insulating film is in direct contact with at least side surfaces and a top surface of the second conductive layer.

14. (Previously Presented) A device according to claim 13, wherein an angle between top surfaces of the tapered portions of the first conductive layer and a top surface of the gate insulating film is in a range of 3 to 60 degrees.

15. (Previously Presented) A device according to claim 13, wherein the first semiconductor island comprises crystalline silicon.

16. (Previously Presented) A device according to claim 13, wherein the first conductive layer includes at least one selected from the group consisting of chromium (Cr), tantalum (Ta), an n-type silicon containing phosphorus, titanium (Ti), tungsten (W), and molybdenum (Mo) while the second conductive layer includes at least one selected from the group consisting of aluminum (Al), copper (Cu), chromium (Cr), tantalum (Ta), titanium (Ti), tungsten (W), molybdenum (Mo), an n-type silicon containing phosphorus, and silicide.

17. (Previously Presented) A device according to claim 13, wherein the semiconductor device is one selected from the group consisting of a video camera, a digital camera, a rear-type projector, a front-type projector, a head mount display, a goggle-type display, a navigation system for vehicles, a personal computer, a mobile computer, a cellular phone, and an electronic book.

18.-45. (Canceled)

46. (Previously Presented) A semiconductor device having an active matrix display device, said display device comprising:

- a first thin film transistor formed over an insulating surface;

- a pixel electrode electrically connected to said first thin film transistor;

- a driver circuit including a second thin film transistor and a third thin film transistor formed over said insulating surface for driving said first thin film transistor, wherein the second thin film transistor is an n-channel thin film transistor and the third thin film transistor is a p-channel thin film transistor,

- wherein said n-channel thin film transistor comprises:

 - a first semiconductor island over the insulating surface;

 - first source and drain regions formed in the first semiconductor island;

 - a first channel forming region in the first semiconductor island between the first source and drain regions;

 - a pair of lightly doped regions formed between the first channel forming region and the first source and drain regions, wherein an impurity concentration in the lightly doped regions is smaller than that in the first source and drain regions;

 - a first gate electrode formed over the semiconductor island with a gate insulating film interposed therebetween,

- wherein said first gate electrode comprises at least a first conductive layer and a second conductive layer formed on the first conductive layer, said first conductive layer having a pair of tapered portions which extend beyond side edges of the second conductive layer,

- wherein the pair of lightly doped regions has a pair of first portions which are overlapped by the pair of tapered portions of the first conductive layer, and a pair of second portions which extend beyond side edges of the first conductive layer,

wherein said third thin film transistor comprises:
a second semiconductor island over the insulating surface;
second source and drain regions formed in the second semiconductor island;
a second channel forming region in the second semiconductor island between the second source and drain regions;
a second gate electrode formed over the second semiconductor island with the gate insulating film interposed therebetween,
wherein said second gate electrode comprises at least a third conductive layer and a fourth conductive layer formed on the third conductive layer,
wherein side edges of said third conductive layer are coextensive with side edges of said fourth conductive layer.

47. (Previously Presented) A device according to claim 46, wherein an angle between top surfaces of the tapered portions of the first conductive layer and a top surface of the gate insulating film is in a range of 3 to 60 degrees.

48. (Previously Presented) A device according to claim 46, wherein the first and second semiconductor islands comprise crystalline silicon.

49. (Previously Presented) A device according to claim 46, wherein the first conductive layer includes at least one selected from the group consisting of chromium (Cr), tantalum (Ta), an n-type silicon containing phosphorus, titanium (Ti), tungsten (W), and molybdenum (Mo) while the second conductive layer includes at least one selected from the group consisting of aluminum (Al), copper (Cu), chromium (Cr), tantalum (Ta), titanium (Ti), tungsten (W), molybdenum (Mo), an n-type silicon containing phosphorus, and silicide.

50. (Previously Presented) A device according to claim 46, wherein the semiconductor device is one selected from the group consisting of a video camera, a digital camera, a rear-type projector, a front-type projector, a head mount display, a goggle-type display, a navigation system for vehicles, a personal computer, a mobile computer, a cellular phone, and an electronic book.

CLAIMS 51-59 (CANCELLED)

60. (Currently Amended) A semiconductor device having an active matrix display device, said display device comprising:

- a first thin film transistor formed over an insulating surface;

- a pixel electrode electrically connected to said first thin film transistor;

- a driver circuit including a second thin film transistor formed over said insulating surface for driving said first thin film transistor,

- wherein said second thin film transistor comprises:

 - a semiconductor island over the insulating surface;

 - source and drain regions formed in the semiconductor island;

 - a channel forming region in the semiconductor island between the source and drain regions;

 - a pair of lightly doped regions formed between the channel forming region and the source and drain regions wherein an impurity concentration in the lightly doped regions is smaller than that in the source and drain regions;

a gate electrode formed over the semiconductor island with a gate insulating film interposed therebetween;

an ~~interlayer~~ insulating film formed over the gate electrode and the gate insulating film;

wherein said gate electrode comprises at least a first conductive layer and a second conductive layer formed on the first conductive layer, said first conductive layer having a pair of tapered portions which extend beyond side edges of the second conductive layer,

wherein the pair of lightly doped regions has a pair of first portions which are overlapped by the pair of tapered portions of the first conductive layer, and a pair of second portions which extend beyond side edges of the first conductive layer, and

wherein said ~~interlayer~~ insulating film is in direct contact with at least side surfaces and a top surface of the second conductive layer.

61. (Previously Presented) A device according to claim 60, wherein an angle between top surfaces of the tapered portions of the first conductive layer and a top surface of the gate insulating film is in a range of 3 to 60 degrees.

62. (Previously Presented) A device according to claim 60, wherein the first conductive layer includes at least one selected from the group consisting of chromium (Cr), tantalum (Ta), an n-type silicon containing phosphorus, titanium (Ti), tungsten (W), and molybdenum (Mo) while the second conductive layer includes at least one selected from the group consisting of aluminum (Al), copper (Cu), chromium (Cr), tantalum (Ta), titanium (Ti), tungsten (W), molybdenum (Mo), an n-type silicon containing phosphorus, and silicide.

63. (Previously Presented) A device according to claim 60, wherein the semiconductor device is one selected from the group consisting of a video camera, a

digital camera, a rear-type projector, a front-type projector, a head mount display, a goggle-type display, a navigation system for vehicles, a personal computer, a mobile computer, a cellular phone, and an electronic book.

64. (Currently Amended) A semiconductor device having an active matrix display device, said display device comprising:

- a first thin film transistor formed over an insulating surface;

- a pixel electrode electrically connected to said first thin film transistor;

- a driver circuit including a second thin film transistor formed over said insulating surface for driving said first thin film transistor, each of the first and second thin film transistors comprising:

 - a semiconductor island over the insulating surface;

 - source and drain regions formed in the semiconductor island;

 - a channel forming region in the semiconductor island between the source and drain regions;

 - a pair of lightly doped regions formed between the channel forming region and the source and drain regions, wherein an impurity concentration in the lightly doped regions is smaller than that in the source and drain regions;

 - a gate electrode formed over the semiconductor island with a gate insulating film interposed therebetween;

 - an interlayer insulating film formed over the gate electrode and the gate insulating film;

 - wherein said gate electrode comprises at least a first conductive layer and a second conductive layer formed on the first conductive layer, said first conductive layer having a pair of tapered portions which extend beyond side edges of the second conductive layer,

wherein the pair of lightly doped regions has a pair of first portions which are overlapped by the pair of tapered portions of the first conductive layer, and a pair of second portions which extend beyond side edges of the first conductive layer, and

wherein said interlayer insulating film is in direct contact with at least side surfaces and a top surface of the second conductive layer.

65. (Previously Presented) A device according to claim 64, wherein an angle between top surfaces of the tapered portions of the first conductive layer and a top surface of the gate insulating film is in a range of 3 to 60 degrees.

66. (Previously Presented) A device according to claim 64, wherein the semiconductor island comprises crystalline silicon.

67. (Previously Presented) A device according to claim 64, wherein the first conductive layer includes at least one selected from the group consisting of chromium (Cr), tantalum (Ta), an n-type silicon containing phosphorus, titanium (Ti), tungsten (W), and molybdenum (Mo) while the second conductive layer includes at least one selected from the group consisting of aluminum (Al), copper (Cu), chromium (Cr), tantalum (Ta), titanium (Ti), tungsten (W), molybdenum (Mo), an n-type silicon containing phosphorus, and silicide.

68. (Previously Presented) A device according to claim 64, wherein the semiconductor device is one selected from the group consisting of a video camera, a digital camera, a rear-type projector, a front-type projector, a head mount display, a goggle-type display, a navigation system for vehicles, a personal computer, a mobile computer, a cellular phone, and an electronic book.

69. (Previously Presented) A device according to claim 13 wherein said active matrix display device is a liquid crystal device.

70. (Previously Presented) A device according to claim 46 wherein said active matrix display device is a liquid crystal device.

CLAIMS 71-72 (CANCELLED)

73. (Previously Presented) A device according to claim 60 wherein said active matrix display device is a liquid crystal device.

74. (Previously Presented) A device according to claim 64 wherein said active matrix display device is a liquid crystal device.

75. (Previously Presented) A device according to claim 13 wherein said active matrix display device is an electroluminescent display device.

76. (Previously Presented) A device according to claim 46 wherein said active matrix display device is an electroluminescent display device.

CLAIMS 77-78 (CANCELLED)

79. (Previously Presented) A device according to claim 60 wherein said active matrix display device is an electroluminescent display device.

80. (Previously Presented) A device according to claim 64 wherein said active matrix display device is an electroluminescent display device.

81. (Previously Presented) A device according to claim 60, wherein the semiconductor island comprises crystalline silicon.

CLAIM 82 (CANCELLED)

83. (New) A semiconductor device according to claim 13, wherein the insulating film comprises silicon oxide.

84. (New) A semiconductor device according to claim 13, wherein the insulating film is a protective film.

85. (New) A semiconductor device according to claim 13, wherein the insulating film comprises a laminate of a first film comprising silicon oxide and a second film comprising silicon nitride.

CLAIMS 86-91 (CANCELLED)

92. (New) A semiconductor device according to claim 60, wherein the insulating film comprises silicon oxide.

93. (New) A semiconductor device according to claim 60, wherein the insulating film is a protective film.

94. (New) A semiconductor device according to claim 60, wherein the insulating film comprises a laminate of a first film comprising silicon oxide and a second film comprising silicon nitride.

95. (New) A semiconductor device according to claim 64, wherein the insulating film comprises silicon oxide.

96. (New) A semiconductor device according to claim 64, wherein the insulating film is a protective film.

97. (New) A semiconductor device according to claim 64, wherein the insulating film comprises a laminate of a first film comprising silicon oxide and a second film comprising silicon nitride.